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TRANSLATION

IS A GRAVITY SCREEN POSSIBLE?

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Let us imagine that one has succeeded in preparing a screen which having been placed between any object and the earth shields this object from the earth's force of gravity. In that case on the object taken by us there would act the insignificant force of gravity of the moon, sun, other planets, and stars. These forces on the earth are so insignificant that it would be practically weightless. Loads of many tons, protected by such a screen, would begin like the sphere of air to rise impetuously, floating upward in the atmosphere. By increasing or decreasing the area of this imaginary screen one could change the speed of the rise of the bodies and stop them at a given height.

It is hard to imagine at once what changes in our life and in modern technology would be wrought by the introduction of the invention of such gravitational-force screen-shields. The upheaval in aviation, the disappearance of modern aircraft, the construction of lifting cranes without power, the multitude of enormous satellites, takeoff and landing areas for space flights with hovering at different altitudes, and finally completely different space ships--these are some of the things that could appear! The noted fantasy writer Herbert Wells dreamed about this. In one of his novels he tells of a flight to the moon in a ship covered by a substance which protects against the earth's force of gravitation.

However attractive such an idea may be, from the point of view of modern physics the existence of such screens is in principle not possible. There-

...e it is easy to imagine how sensational the report of the French scientist M. Allais was, who at the time of the total eclipse of the sun on June 30, 1954 discovered a screening of the solar attraction by the moon. All is carried out his observations in Paris using a special pendulum set up in the laboratory. At the time of the eclipse he noticed an extraordinary change in the plane of oscillation of the pendulum. At the moment of the beginning of the eclipse the azimuth of the pendulum changed by five degrees, and just before the middle of the total eclips it reached fifteen degrees. After the eclipse the plane of oscillation returned to its former position. Allais explained that the effect noted by him was connected with a change in the field of gravity at the time of the eclipse.

The first attempt at discovering a screening of the sun's gravitational force was made by the Russian scientist Yarkovskiy near Moscow at the time of the solar eclipse of the 7th of August 1887. A special instrument was designed by him consisting of very precise spring weights in which the weight of the load balanced the resilient force of the spring. With a change in the weight of the load a pointer deviates which is connected with the spring. Such instruments have received in modern times the designation "gravimeters. They have been considerably improved and are used now formany purposes at special gravimetric stations. Yarkovskiy's gravimeter at the time of the visible conjunction of the disks of the moon and the sun began to show deviation from the zero position. However, the measurements taken by Yarkovskiy are now received with doubt. In fact, under the action of the sun's attraction the weight of any body found on the surface of the earth changes by one sixteen millionth of this weight. To follow such an insignificant change by an instrument created seventy-five years ago seems impossible. At the time of the measurements conducted by Allais the precision of the gravimeters ...improved so much that they reliably record the periodic changes in the

force of gravity brought about by the different arrangements of the sun and moon with reference to the point of observation. The recording of these changes is regularly done at the gravimetric stations, and it aids in solving many problems. Thus, for example, first of all data were obtained about the influence of the earth on the motion of the moon and the form and the internal structure of the earth. Gravimeters are used with success in prospecting for useful minerals, aiding the public economy. Therefore it is understandable that the effect noted by Allais, with the aid of perfected instruments, was to arouse many arguments and guesses. At the conference held in Berlin by European and Asiatic countries--participants in the International Geophysical Year--the decision was taken to conduct similar observations at the time of the solar eclipse on February 15, 1961. The measurements taken at the time of this solar eclips in some countries and at many points of the Soviet Union gave the most contradictory results. The most interesting experiments were conducted by a group of scientific workers from the Department of Celestial Mechanics and Gravimitry of the Moscow University.

This group conducted observations of the total solar eclips in Rostov-on-Don. A part of their task was to repeat Allais's experiments with the pendulum and to make observations with gravimeters. For the experiments there was chosen the basement under the capitol building. The basement exits were closed with massive cast-iron doors and rubber linings. The instruments were set up in different rooms on the ground floor and the pendulum was fastened on two rails cemented into the brick wall. Three hours before the total phase of the eclipse, in the area around the building where the basement with the instruments was, all automotive transportation was forbidden, in order to avoid tremors that might affect the gravimeters

nd the pendulum.

What kind of results were obtained from the observations of this group?

The change in the plane of oscillation of the pendulum was of a random nature and had no connection with the eclipse. The most precise and dependable work was done by the gravimeters, which were thoroughly insulated from outside influences, and they did not react to the solar eclipse. An effect of change in the force of gravity was observed on unreliable instruments that were insufficiently insulated from outside influences.

The authors themselves of the complex of observations are inclined to think that the present-day instrument, as before, are insufficient for observing the effect of screening the sun at the time of an eclipse, if indeed, such and effect is possible. If there exists a screening of the force of gravity then it should appear not only at the time of solar eclipes when the moon serves as a screen, but also under the different directions of the solar influence on the force of gravity on the day and night sides of the earth where the screen would be the earth. Apparently, future experiments with more precise instruments will definitely solve the problem as to whether or not there exists a screening of the force of gravity, a problem which has attracted the attention of scientists for considerable time.

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